E/CONF.39/D/2
SUMMARY
21 Sept.1962
ORIGINAL : ENGLISH

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

SUMMARY

Agenda Item: D.3.3

United Kingdom

THE FUNCTION OF A NATIONAL PHYSICAL LABORATORY

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THE FUNCTION OF A NATIONAL PHYSICAL LABORATORY

by

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SUMMARY

A national physical laboratory fulfils the following three principal needs in the technological development of a country:

(a) It provides the scientific backing for the national weights and measures authority responsible for laying down the legal standards of the various physical quantities required in commerce, industry and in the legal enforcement of various government regulations, e.g. hazards to public health and safety.

(b) It provides an independent and impartial authority for the testing, maintenance, verification and improvement of the secondary standards of physical quantities required in commerce, engineering, agriculture and medicine.

(c) It provides a country with a national research centre which can undertake basic and applied work on major problems in the application of physics to industry which cannot be handled by individual firms or organisations but have to be tackled on a national basis.

In connexion with the first two responsibilities, which are to some extent interdependent, it should provide facilities for work in the following fields:-

Standards of mass, length, time, heat, sound, radiation of all types, and of all electrical and magnetic quantities
Electrotechnics
Mechanical properties of metals and non metals
Testing and calibration of measuring instruments
Atomic Physics and Electronics
Meteorological studies.

Nuclear physics has been omitted from this list of topics because it has always been found necessary to have a separate establishment to deal with atomic energy, partly because of the scale of the effort required and partly for political reasons. Nevertheless, it has been found advisable

for the national laboratory to take the responsibility for standards in the field of nuclear energy and radiation. Even when an under-developed country is not going to use nuclear power, it will require radioactive isotopes and will wish to be in a position to measure radioactive fall-out.

For purposes of international trade, it is essential that close co-operation exists on national standards between various countries. This is best done through a national physical laboratory having representation on the two international organisations concerned with the scientific and legal sides of metrology, viz. the Bureau International des Poids et Mesures in Paris and the Organisation Internationale de Métrologie Légale also in Paris. A new country can profit greatly from the experience of other countries by adhering to these organisations and the expense involved is out of all proportion to the benefits which can be gained.

The third responsibility is a very wide one and it cannot be sharply defined since industry must carry a large share of this responsibility itself if it is to be progressive and self reliant. Nevertheless there are certain areas and problems which are best tackled by national laboratories under government control, rather than by individual firms or manufacturing industries. This is particularly true when the capital investment is very large in the pioneering stages, or when the government laboratory has special expertise in the new field, or when government must maintain control of the new development for political or other reasons. It requires not one laboratory but a complex of laboratories which should either be part of, or adjacent to, the national physical laboratory. These laboratories might cover the following areas, the choice and priority depending on the circumstances and needs of the individual countries, viz.

Metallurgy
Electronic Computers and Automation
Hydraulics
Aerodynamics
Ship Hydrodynamics.

The work of these laboratories will overlap to some extent related work going on in industry and in the universities. Unless a country has a national physical laboratory, certain problems vital to the technological progress of a country may never be undertaken either by industry or by the universities. Industry tends to be so pre-occupied with urgent short-term problems that the application of new discoveries in pure physics to industrial processes tends to be neglected. Universities should be left free to pursue the lines of research most suited to the abilities and inclinations of the staff. However, movement of staff in both directions between the national physical laboratory and the universities and industry is important if the maximum benefits are to be obtained.

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